983'). In addition, claims 46 through 51 were rejected under 35 U.S.C. § 103(a) as unpatentable over Yin '356, Yusong '983, Butterworth and Yin '841 pub.

In response to the Office Action, Applicant has amended independent claim 1 to require that the fundamental beam and the selected wavelength beam incident on the OPO generator at the same preselected polarization. Independent claims 38, 43 and 56 have been amended to require that the fundamental beam and the preselected wavelength beam both incident on the OPO generator at P-polarization. Support for the amendment can be found in the specification at page 16 and page 17 lines 17 to 21.

According to the invention, a laser resonator having a laser resonator cavity formed between a first laser resonator reflective surface and a second laser resonator reflective surface is claimed. A lasing medium is located within the laser resonator cavity which generates a fundamental wavelength beam. An optical parametric oscillator (OPO) cavity is formed between a first OPO reflective surface and a second OPO reflective surface. The optical parametric oscillator cavity has an oscillator optical axis which is in part separate from the resonator optical axis and which in part overlaps said resonator optical axis. An OPO nonlinear generator for OPO generation is located within the OPO cavity along the oscillator optical axis and along the resonator optical axis in optical communication with the first and said second OPO reflective surface. The OPO nonlinear generator is oriented to convert the fundamental wavelength beam into a preselected wavelength beam having a preselected longer wavelength than the fundamental beam. The fundamental wavelength beam is directed into the optical parametric oscillator cavity along the oscillator optical axis and through the OPO nonlinear generator at a preselected polarization to convert a first portion of the fundamental wavelength beam to a preselected wavelength beam having a longer wavelength than the fundamental beam. The resulting preselected wavelength beam has the same preselected polarization as the fundamental beam incidenting on the OPO generator. The optical axes intersect

on opposed faces of the OPO nonlinear generator. The opposed faces have a Brewster cut at the intersection of the OPO nonlinear generator so that the fundamental beam and the preselected wavelength beam incident on the generator within 10 degrees of the Brewster angle for the generator. Both the preselected wavelength beam and the fundamental beam incident on the OPO generator at the same preselected polarization. The fundamental beam is reflected by said first resonator reflective surface back through the OPO nonlinear generator at the preselcted polarization to convert a second portion of the fundamental laser beam to preselected wavelength beam having the same preselected polarization as the fundamental beam. The preselected wavelength beam is reflected by the OPO first reflective surface to oscillate the preselected wavelength beam in the OPO cavity. A first beam separator is provided in optical communication with the OPO nonlinear generator to separate the preselected wavelength beam from the fundamental wavelength beam after the second portion of the fundamental beam has been converted to preselected wavelength beam. The separated fundamental beam is then directed back through the lasing medium for further amplification. The separated preselected wavelength beam is directed to the second OPO reflective surface where the beam is at least partially reflected back through said OPO nonlinear generator at the preselected polarization.

Independent claims 38, 43, and 56 require the preselected polarization is p-polarization. Independent claim 43 provides a laser for producing 193nm beam using a single lasing crystal which has been a challenging task in the art without employing two lasing crystal at different wavelengths.

Reconsideration of the rejection is respectfully requested. Applicant's invention provides an advantageous apparatus and method for generating preselected wavelength beams using an OPO generator.

Claims 1 through 27, 38, 39 and 54 through 56 were rejected as unpatentable over Yin '356 and Butterworth '559. The Yin '356 patent shows an optical parametric oscillator in which the oscillator optical axis is in part separate

from the resonator optical axis and in part overlaps the resonator optical axis. As recognized by the Examiner, it does not show a non-linear crystal having a Brewster cut nor does it show or suggest fundamental and preselected wavelength beam incident on the generator within 10° of the Brewster angle for the generator. In addition, Yin '356 does not require that the fundamental beam and the preselected wavelength beam both incident on the non-linear crystal at the same polarization. The Butterworth publication does not remedy the deficiencies of Yin '356. The Butterworth patent discloses a ring laser. Butterworth is not a laser resonator formed between two reflective surfaces. The Office Action indicates that that Butterworth discloses a non-linear crystal having a Brewster angle cut is shown and refers to paragraph 41 of the patent. The paragraph referred to by the Examiner states that the fundamental radiation incidents on the mirrors 96 at the Brewster angle. It is silent about the harmonic non-linear crystal 49. Apparently, the Examiner is assuming that crystal 49 is a Brewster cut despite the fact that the patent is silent about the fact. Nevertheless, assuming that the Examiner is correct that crystal 49 is provided with a Brewster cut, it does not show or suggest Applicant's invention. Crystal 49 is a harmonic doubling non-linear crystal for conversion of a second harmonic beam to a fourth harmonic beam. The mechanism of conversion is a direct conversion of a portion of the second harmonic beam to a fourth harmonic beam by doubling. There is no cavity oscillation required in such a device. Thus, there is no requirement that the produced fourth harmonic beam incidents on the non-linear crystal and certainly there is no requirement that both the second harmonic beam which is converted to fourth harmonic and the fourth harmonic beam have the same polarization upon incidenting on the crystal. In fact, the polarization of the beams would be opposite to one another as a result of the conversion mechanism of the crystal.

In Applicant's invention, an OPO crystal is used, required in paragraph C and d of the claim 1. This is not shown or suggested by Butterworth. Moreover, in combining Butterworth with Yin '356 as suggested by the Examiner, there are

inherent difficulties due to the difference in the mechanisms of harmonic generation and OPO generation. There is simply no suggestion that in addition to employing the Brewster cut of the harmonic generator assumed by the Examiner from Butterworth that one should maintain the two (2) beams at the same polarization and then substitute the unrelated OPO generator of Yin '356 for the harmonic generator of Butterworth. In fact, if the teaching of Butterworth is applied, one would have the fundamental and preselected wavelength beams having orthogonal opposite polarization. Certainly, using beams having the opposite polarization has no affect in the performance of the Butterworth patent since harmonic generation requires no oscillation. In the OPO oscillator, if the preselected beam has orthogonal polarization from its pumping beam(the fundamental wavelength beam), this OPO would not be functional since the preselected beam would see substantial loss which would prevent is from oscillation. Thus it is submitted that claimed invention is neither shown nor suggested by Butterworth either alone or combined with Yin'356.

Claims 28 through 32 and 43, were rejected under 35 U.S.C. over Yin '356, Butterworth '559, and Yin '841 pub. The Yin '841 pub. does not supply the missing elements as discussed above in relation to Yin '356 or Butterworth '559. The Yin '841 pub. was cited for disclosing multiple harmonic generators . As discussed above there is no teaching in any of patents of record that would suggest the combining the disclosure relating to the operation of a harmonic crystal to the operation of an OPO non-linear crystal. The crystals operate on different principals and encounter different problems. Yin pub. discloses a high powered laser. It does set forth a laser having an OPO non-linear crystal, but there is no Brewster cut therein nor is there any showing that the preselected wavelength beam and fundamental wavelength beam have the same polarization upon incidenting on a Brewster cut non-linear crystal as required by claim 1.

Claims 46 to 51, were rejected under 35 U.S.C. over Yin '356, Butterworth '559, Yin '841 pub further in view of Yusong '983. Yusong '983 primarily discloses

intracavity third harmonic laser. It does remedy any of the deficiencies of the prior art as discussed above.

Regarding claims 43 through 55 which relates to the production of a 193 nm beam, none of the art of records shows or suggests such a device. The Office Action merely speculates that one might be able to construct such a device once one had the roadmap of Applicant's invention. The Examiner went and found pieces of prior art to put together the 193nm device as claimed by Applicant. Of course, this is clearly the exercise of hindsight which is strictly prohibited. **See** Ecolochem Inc., v. Southern Cal. Edison, 56 USPQ2d 1065 (Fed. Cir. 2000). Generally, in the art, generation of 193nm beams required the use of two (2) fundamental lasers. This is avoided in Applicant's invention. The Examiner has shown no suggestion to make the combination set forth in the Office Action to come up with a 193nm beam device. Hundreds if not thousands of configurations could be made from the combination of lasers set forth in the office action. Without using the present application as a roadmap, the is no suggestion to make the combinations suggested by the examiner. Thus, the rejection of claims 43 to 55 is totally without merit as based on hindsight.

It is submitted that the application is in condition for allowance. An early notice to that effect is earnest solicited.

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